46.38; knee 69.75; thigh 76.30; and hip 85.40. These results are very different from those usually adopted, and show that the rate of mortality does not necessarily increase in the upper extremity, as the trunk is approached.

4. Excisions in the continuity of the long bones of the extremities give the following percentages of deaths. Radius 10.48; ulna 13.39; ulna and radius 17.27; fibula 20.51; tibia 22.72; humerus 25.87; tibia and fibula 37.50; and femur 87.23.

5. Excisions of the joints afford the following scale of mortality. Elbow 20.20; wrist 21.21; shoulder 33.28; ankle 54.54; knee 71.42; and hip 90.69.

6. The conservative treatment of gunshot injuries of the bones and joints gives the following scale of mortality. Bones of the forearm 12.43; wrist 14.63; humerus 20.73; ankle 21.05; bones of the leg 24.80; shoulder 57.47; elbow 61.90; thigh 63.61; knee 82.02; and hip 92.22.

S. W. G.

ART. XV.—*Club-Foot; its Causes, Pathology, and Treatment:* being the Essay to which the Jacksonian prize for 1864, given by the Royal College of Surgeons, was awarded. By WILLIAM ADAMS, F.R.C.S., etc. etc. With one hundred illustrations on wood and stone. 8vo. pp. xviii., 422. London: John Churchill & Sons, 1866.

THIS handsome volume comes before us with what may be considered as the stamp of authority, having received the Jacksonian prize offered by the Royal College of Surgeons in 1864, for an "Essay on Club-foot, its causes, nature, and treatment." In its present form it has been altered, as we learn from the preface, only in such manner as was required by the change from a competitive essay with concealment of the author's name to an avowed publication in which the writer is entitled to claim for himself credit for any original observations or investigations he may have previously made. An appendix has also been added, containing the records of seventeen illustrative cases.

As the pathology and treatment of club-foot is comparatively little understood by the large majority of the profession in this as in other countries, we propose to call the attention of our readers to the more prominent points brought forward in Mr. Adams's volume, recommending at the same time a careful study of the book itself to all who may be called upon to conduct the treatment of this most troublesome class of cases.

The work before us contains twenty chapters, exclusive of the appendix, and is adorned with one hundred well executed wood-cuts, and a handsome lithographic plate illustrating the pathological changes in the minute anatomy of the muscles in cases of non-congenital club-foot.

The first chapter describes the various forms of club-foot, and gives a sketch of the history of subcutaneous tenotomy in the treatment of the affection. *Talipes* is a generic term for all forms of the disease; the author recognizes four principal varieties, to wit: *equinus, varus, valgus,* and *calcaneus,* with an equal number of mixed varieties, viz: *equino-varus, equino-valgus, calcaneo-varus,* and *calcaneo-valgus.*

In *varus* and *valgus* it is the anterior part of the foot alone that is inverted or everted, and *varus* is always, and *valgus* usually accompanied with elevation of the heel.

Each of the eight varieties named may be either congenital or non-congenital, though cases of true congenital equinus are exceedingly rare.

The first operation for the cure of club-foot was performed in the year 1784, by a surgeon named Lorenz, upon the recommendation of a physician named Thilenius (of Frankfort), who has the honour of having first proposed tenotomy as a means of curing this affection. The mode of operating was by a simple incision, involving the skin and all the subjacent tissues, the wound healing in about seven weeks, and a perfect cure resulting from the treatment. Similar operations were performed afterwards by Sartorius and Michaelis with more or less favourable results, and we come then to the year 1816, when Delpech, the illustrious surgeon of Montpellier, made the first approach to the subcutaneous method as now practised, by transfixing the limb beneath the tendo-Achillis, and dividing the latter from within outwards, taking care to leave the skin uninjured over the divided extremities of the tendon. Delpech operated but once, and no further attempt is recorded until 1831, when Stromeyer, of Hanover, made another improvement by dividing the tendon through a "puncture" without external incision. Among the earlier followers of Stromeyer in establishing subcutaneous tenotomy as a recognized and legitimate operation, are to be named Dieffenbach, Bouvier, Pauli, Duval, J. Guérin, Bonnet, and Scoutetten. The first operation in England was performed in 1836, by Mr. Whipple, of Plymouth, though to Dr. Little is due the credit of publicly introducing the new mode of treatment to the profession of London in the following year.

Such is the history of subcutaneous tenotomy. Mr. Adams, however, properly gives to Hunter the credit of having enunciated the law "on which," in the words of Mr. Paget, "is founded the whole practice of subcutaneous surgery."

Chapter second treats of "the reunion of tendons after subcutaneous tenotomy, and the rate of extension after operation in the treatment of club-foot." A full account is given of the experiments which have been performed at different times by various observers with the intention of determining the mode of union of divided tendons, and secondarily the *modus operandi* of tenotomy. The ordinary view, held with slight variations by Stromeyer and by Messrs. Tamplin and Brodhurst, is that the connecting medium, whatever may have been its original length, gradually contracts until it becomes a mere linear cicatrix, the English authorities named believing that in this process of contraction the muscle is mechanically stretched and elongated, while Stromeyer, holding likewise to the view of muscular elongation, attributed it to a diminished power of contraction supposed to be brought about by a dynamic influence exerted by the division of the tendon.

Mr. Adams has not only experimented himself upon the division of tendons in the lower animals, but has published the results of fifteen *post-mortem* examinations which he has been enabled to observe in cases of patients who had been operated upon for club-foot, and who had died at periods of from four days to three years after the operation.

The opportunities for investigation thus afforded him have been so unusually ample, that we think it but right to reproduce his conclusions in full for the benefit of our readers. These conclusions are :—

"That tendon is one of the few structures of the body capable of reproduction or regeneration, and that the newly-formed tissue acquires within a few months of its formation the structural characters of the old tendon so perfectly, that, under the microscope, it is with difficulty distinguishable from it; but it does not acquire through its substance the uniformly opaque, pearly lustre of old tendon. In the mass, the new connective tissue retains a grayish translucent appearance, so that the recent section affords an easy method of distinguishing the new from the old tendon.

"The greatest length of perfectly formed new tendon which I have seen, is two inches and a quarter, and this was in the tendo-Achillis of a girl aged ten. The tendon had been divided by Mr. Curling a year and a half previous to amputation of the limb.

"That the process by which new tendon is formed is essentially similar in animals and in man.

"That the perfection of the reparative process is in direct proportion to the absence of extravasated blood and inflammatory exudation; and

"That the sheath of the tendons, when consisting of loose textured areolar tissue, as in the tendo-Achillis, and other tendons surrounded by soft tissues, is of importance,

"1st. In preserving a connection between the divided extremities of the tendon;

"2d. In furnishing the matrix in which the nucleated blastematous or proper reparative material is effused; and

"3d. In giving definition and form to the newly-developed tendinous tissue.

"That the new tendon always remains as a permanent tissue, and as an integral part of the tendon, the divided extremities of which it has been formed to reunite. . . . . .

"The average length of new tendon formed in children operated upon for club-foot, to reunite the divided extremities of the tendo-Achillis, appears from my observation to be from half an inch to an inch, and in adults from one to two inches. . . . .

"From my observations it appears that in the cure of deformities, muscles are elongated by the increased length of their tendons, obtained by means of subcutaneous division and the development of new tendon formed for the purpose of reuniting the divided extremities of the old tendon. . . . .

"Complete failure of union I have witnessed only in the posterior tibial tendon, and it appears that there is considerable risk of such an occurrence whenever tendons are divided in or near to dense tubular sheaths.

"Imperfect union may result either from some constitutional defect in the reparative powers of the patient, or from injudicious after-treatment in a variety of ways, but principally from too early and too rapid mechanical extension.

"When recontraction of the foot takes place, and the deformity returns at a distant period after tenotomy, this does not depend upon absorption of the new material, or new tendinous tissue formed previously to unite the divided extremities of the old tendon, but upon structural alterations taking place in the muscular tissue.

"In three relapsed cases of deformity of the foot which I have examined, the new tendinous tissue formed, after the previous operation, remained, and could easily be distinguished from the old tendon; these facts must be regarded as additional evidence against the linear cicatrix theory." . . . . .

In one case "the deformity (talipes equinus) had returned a year and a half after the Achilles tendon had been divided, and yet two inches and a quarter of new tendinous connecting tissue could be distinctly seen in the Achilles tendon."

The rate of extension after tenotomy should vary with the peculiarities of each case. In every instance the foot should be kept for a few days after the operation in the original deformed position. The gradual restoration to the normal position should then be begun, the rapidity of restoration depending upon the activity of the reparative process, though in practice it is frequently limited by the ligamentous rigidity of the joint. In well nourished infants the time required for the tendo-Achillis is, according to Mr. Adams, about two weeks; in a well nourished adult limb, from three to four weeks; but, in atrophied paralytic limbs, not less than five or six weeks.

> "The object of gradual extension is not so much to elongate or stretch the new material uniting the divided extremities of the tendon, as generally supposed; but rather to regulate the length of new material, or, as it may be called, the new tendon, while we have the opportunity of so doing, *i. e.*, during the period of its formation or regeneration; and the rate at which this is to be accomplished must have reference to the activity of the reparative process, and the length of new tendon required."

In cases of paralytic equinus, if there be not much articular rigidity, too rapid extension may develop the opposite condition of calcaneus; while, on the other hand, if the ligamentous rigidity be excessive, it may be in some cases necessary to divide the tendon a second time in order to obtain the required amount of elongation.

In chapter 3d are discussed "the relative merits of tenotomy, and the stretching of muscles and other tissues, by mechanical means, in the treatment of club-foot." In this chapter our author enunciates the principle which is demonstrated by the reasoning of the whole volume, that most cases of club-foot require "a judicious combination of operative, mechanical, and physiological means" for their successful treatment, and refers in terms of reprobation to the doctrines advanced respectively by Prof. Syme and Mr. Barwell.

The eminent surgeon of Edinburgh teaches that tenotomy alone is sufficient to effect a cure, the foot being immediately placed in the desired position, and the patient required to exercise the limb by walking in a very few days. Mr. Barwell, on the other hand, rejects tenotomy altogether, and proposes to treat club-foot by a mechanical arrangement of splints and elastic cords. The language which Mr. Adams uses with regard to the opposing views of these gentlemen is unmistakably emphatic, and not particularly complimentary, though probably well deserved, as neither of them has been over modest in the promulgation of his own opinions. At any rate, and this is the most important point, Mr. Adams has, we think, conclusively shown the correctness of his own views, and the manifest incorrectness of those of his antagonists. Lord Byron, who suffered from congenital varus, was an illustrious example of the failure of mechanical means alone to effect a cure; and, except in slight cases, it is doubtful if a permanently successful result has ever been obtained without operative treatment. Certain it is, according to our author, that Mr. Barwell's "new method" is neither new nor original with Mr. Barwell; moreover, it had been tried and rejected as a failure, in St. George's Hospital, several years before the publication of Mr. Barwell's book.

With regard to Mr. Syme's doctrine, "the true answer," says Mr. Adams, "is, that in severe cases tenotomy alone will not enable us to restore the form of the foot, in consequence of the adapted shortening of the ligaments; and in slight cases the danger of non-union, or excessive elongation of the new connecting material, should deter any surgeon from adopting Mr. Syme's recommendation."

Many children are born with slight inversion of the feet; in these the deformity can generally be remedied by "manipulation" alone, assiduously practised by the mother or nurse. Another large class of cases may be cured either with or without operation, though, as tenotomy will diminish the time required in treatment, it will sooner allow the muscles to obtain their proper physiological development, and may therefore be advantageously employed in many cases of this class. In cases of a still more severe nature, tenotomy is absolutely indispensable.

"The following," says Mr. Adams, "are the indications upon which we must rely in determining the necessity of the operation: 1st, when the foot cannot be fully everted or brought to a straight line with the leg by manipulation, and when, in the attempt to accomplish this, the inner malleolus does not become prominent. 2d. When the os calcis either cannot be depressed at all, or only to a slight degree, so that, after the partial eversion of the foot, little or no flexion at the ankle-joint can be obtained."

The above remarks and rules, which are given in reference to congenital talipes varus, are equally applicable, *mutatis mutandis*, to all other varieties of club-foot.

Chapters 4th and 5th are devoted to a consideration of the general pathological conditions under which the majority of cases of club-foot are found to occur. The non-congenital cases constitute about three-fifths of the whole number, and with a discussion of their pathology the present portion of the volume is occupied—the pathology of the congenital varieties being reserved for that devoted to congenital varus, which is by far the most important form of club-foot.

Nine-tenths of all non-congenital cases depend upon either muscular spasm or muscular paralysis; but, although the structural changes vary according to the cause (in spasmodic cases the minute anatomy of the muscles being almost unaltered, while in paralytic cases fatty degeneration begins early and progresses rapidly), yet a practical difficulty is found in distinguishing them: for in paralytic cases, in the adult especially, the muscles may be rigid or flaccid at different periods in the same case.

Hence our author finds it more convenient to divide all these cases into four classes, viz:—

"1st. Deformities with rigid muscles; the rigidity or tonic muscular contraction remaining as a persistent condition from the time of seizure. All non-congenital, and generally infantile affections.

"2d. Deformities with rigid muscles; the rigidity or tonic muscular contraction being consecutive to a flaccid and paralytic condition of the muscles. All non-congenital, and generally occurring in the adult.

"3d. Deformities with flaccid muscles; the contractions depending upon position and adapted muscular atrophy. All non-congenital, and generally infantile affections, or occurring in early childhood.

"4th. Deformities with the muscles in a healthy or nearly healthy condition. These are cases in which the paralysis has been more or less completely recovered from, but the deformity produced by contraction during the stage of paralysis remains as a persistent condition. All non-congenital, and generally occurring in early childhood."

The symptomatology, morbid anatomy, prognosis, and treatment of each of these classes is then discussed at some length. Dr. Radcliffe's views upon nervous action and muscular contraction (according to which muscles contract by an inherent property of their own, upon the withdrawal of the nerve stimulus which prevents their contraction) are referred to with a qualified approval.

The prognosis of the first class of cases is decidedly unfavourable when the cases are severe; they can, however, often be much benefited by a combination of the three methods of treatment—the operative, the mechanical, and the physiological.

The prognosis of the second class (that where rigidity follows paralysis) is also unfavourable, because, though the deformity may be cured, the defective voluntary power will remain, and because, as a rule, many muscles are involved. Still, even in cases of hemiplegia in the adult, much comfort may sometimes be afforded to the patient by judicious tenotomy. "The most favourable condition which can exist is the comparatively healthy condition of the muscles surrounding the hip-joints."

A discussion of the third class of cases (deformities with flaccid muscles) involves a short account of "Infantile Paralysis, and its Peculiarities, as compared with Paralysis in the Adult." This account, which occupies only eight pages, we would especially commend to our readers as eminently clear and satisfactory. When cases of infantile paralysis do not terminate in spontaneous recovery within a few months, the resulting deformities will generally become permanent, and can then be greatly ameliorated by surgical interference. "In all these cases the treatment essentially consists in the removal of existing deformities by tenotomy and mechanical means, and a subsequent compensation for the existing paralysis by mechanical support, varying in different cases according to the extent of the paralysis." Fortunately, in these cases, the muscles of the hips are usually unaffected.

Cases of the fourth class (where the muscles are in a healthy condition after recovery from paralysis) are the most favourable that are met with in practice; in them can be removed not only the deformity, but not unfrequently all traces of lameness.

Chapters 6th and 7th treat of Talipes Equinus. This is very rarely met with as a congenital affection; in fact, Mr. Adams has seen but three such cases, and even in them the evidence of the existence of the deformity at birth was not absolutely conclusive. On the other hand, talipes equinus is by far the most frequently met with of all the non-congenital deformities, constituting, according to Mr. Tamplin's statistics, about 40 *per cent.* of the cases occurring after birth, and 22½ *per cent.* of the entire number of cases of club-foot. Mr. Lonsdale's statistics place the proportion still higher—he and Mr. Adams having found 170 cases of talipes equinus in a total of 495 [34⅓ *per cent.*] treated at the Royal Orthopædic Hospital in three years.

The various causes of this deformity are discussed at some length, and with great fairness and candour. The prognosis may be considered as always favourable as regards the removal of deformity, except in the very rare cases in which bony anchylosis has taken place; but as regards the recovery of use of the limb, the prognosis must, of course, vary with the cause and duration of the malady, and the structural changes that may have taken place.

The operative treatment consists of the division of the tendo-Achillis, and in severe cases of the plantar fascia as well: it is generally better to divide the latter (when necessary) as a preliminary operation, thus securing the immobility of the posterior extremity of the arch of the foot (which will be held firm by the rigid tendo-Achillis) and so materially facilitating what is called the expansion or unfolding of this arch. Severe contractions of the toes frequently coexist with talipes equinus, but are usually remedied by the section of the Achilles tendon alone, though, if necessary, the extensor or flexor tendons of the toes, or both, may be likewise divided.

Mechanical extension should be begun on the third day after the operation in cases of infants, and in those of adults where the nutrition of the leg is unimpaired. In paralytic cases it may be advisable to wait a few days longer. The apparatus employed is a modification of that originally introduced by Scarpa, and still known as Scarpa's shoe. The alterations which have been introduced by Mr. Adams himself seem to us great improvements. They have been made after a careful consideration of the morbid anatomy of the deformity, and of the changes of form which must take place in the process of cure. The most important of these alterations seem to us to be the introduction of a transverse division in the sole plate, corresponding to the transverse tarsal joint in the foot, and the bringing the heel-strap directly backwards through an aperture in the heel-plate and sole instead of transversely across the front of the large heel-plate used in the ordinary forms of the apparatus.

The *physiological* treatment consists principally in the judicious employment of passive motion, which should be begun when the required length of new tendon has been obtained, or, in cases of ligamentous rigidity, even during the latter periods of mechanical extension. Remarks upon Talipes Equino-varus and Talipes Equino-valgus conclude the seventh chapter.

Chapters VIII. to XVII. inclusive are devoted to Talipes varus, all but the last of these treating of the congenital variety. It is not our intention to attempt an analysis of this portion of Mr. Adams's book, for it would be impossible to do it justice in the narrow limits of a review. The author has here displayed a familiarity with the literature of his subject, as well as a thorough acquaintance from personal observation and study with the pathology and morbid anatomy of the deformities of which he treats, which must always make his work an authority of the highest importance. We shall content ourselves with noting a few points which appear to us of especial interest on a careful perusal of the volume, and refer our readers to the book itself as a most admirable exposition of the whole subject under discussion. We find on page 126 a convenient diagnostic sign for distinguishing the congenital from the non-congenital forms of varus. In the former variety there are "two deep furrows, one taking a longitudinal, and the other an obliquely transverse direction," which "may with certainty be relied upon. In non-congenital cases they are either absent or but slightly marked." This is important with a view to prognosis, for in the congenital form there is little or no muscular degeneration, while in the non-congenital, fatty degeneration in the muscular tissue rapidly advances, and the prospect of successful treatment is of course greatly diminished.

A fact which should be remembered is that the *bones* in cases of varus are found to be altered both in relative position and shape. "It may . . . be looked upon as an established fact, that in a severe case the astragalus is considerably malformed at the period of birth" [page 141]. This osseous malformation appears to result from the pressure of the adjacent bones during the latter part of their intra-uterine growth, and it is rendered probable that by an early restoration of the foot to its normal position the subsequent growth and ossification of the astragalus would occur with a gradual return to its proper form; hence a cogent argument in favour of early operations in these cases. "It is advisable," says Mr. Adams, "that the operation be performed as soon after the first month from the period of birth as the circumstances of the case permit, having special reference to the healthy condition of the child and mother. Practically, I find that the most favourable time for operation is when the child is about two months old."

In considering the etiology of congenital talipes varus, our author gives at length the various arguments for and against the respective theories of its spasmodic origin, and of its causation by malposition and pressure *in utero*, and then declares his adhesion to the former hypothesis as being the more satisfactory and the more tenable.

A curious instance of hereditary transmission of talipes varus is given on page 200.

From Mr. Tamplin's tables, before referred to, we learn that of 764 cases of congenital club-foot, no less than 688, or 90 per cent., were of talipes varus. Both feet were affected in 363 of the 688, the right foot alone being involved in 182, and the left foot alone in 138. The remaining five were of a compound nature.

One of the most alarming accidents that can occur in the operation of tenotomy is the wounding of the posterior tibial or the internal plantar artery, the former vessel being sometimes cut in the division of the tibialis posticus tendon, and the latter in the division of the plantar fascia. Pressure, if immediately applied, is generally sufficient to effect a cure, but several cases are on record where the accident has been followed by the formation of a false aneurism. Mr. Adams has met with four such cases himself—three in his own practice and one in that of Mr. Tamplin. In the latter, and in two of his own, recovery followed the use of pressure, but in the remaining instance, which occurred in 1853 (the posterior tibial being the artery involved), pressure produced a slough (in consequence of the mother's neglect), and the child being exhausted by two profuse hemorrhages, Mr. Adams injected five or ten drops of the concentrated solution of the perchloride of iron, as recommended by M. Pravaz of Lyons. The result was a complete success, the treatment of the deformity being afterwards continued: "the restoration of the foot was in a few weeks as complete as in other cases."

The tendons of the contracting muscles having been divided, the mechanical portion of the treatment demands attention, and the objects of this must be:—

> "1. To insure the requisite elongation of the contracted and shortened muscles, by regulating the length of the new tendon formed during the reparative process after division.
>
> "2. To replace or reconduct to their normal positions the displaced bones.
>
> "3. In accomplishing the second object, to elongate the contracted and shortened ligaments.
>
> "4. To retain the bones in their normal relations, and to encourage the use of the joints in their natural directions, so that as growth proceeds, assuming the treatment to be undertaken in childhood, the bones may improve in form, and the muscles be brought into exercise with the view of promoting their structural development and physiological perfection."

The mechanism of talipes varus, and the corresponding mechanism of its treatment are fully explained by our author, and several forms of apparatus described and figured, which he has found particularly useful. And here we must again commend the ingenuity and practical good sense manifested in the design and construction of these instruments. They are, we think, better adapted to accomplish their purpose quickly, permanently, and *with comfort to the patient*, than any others with which we are acquainted. It would be impossible to give a correct idea of these instruments by mere verbal description, unaccompanied by the illustrative drawings, and we must therefore refer our readers to Mr. Adams's volume itself, where they will find a full and lucid account of the various apparatus required.

The probable duration of treatment necessary in cases of varus is an important matter for the surgeon to bear in mind, as he will probably be questioned upon this point by the friends of the patient. In general terms the time required may be said to vary with the age of the child and the amount of ligamentous rigidity. "In severe infantile cases the deformity may generally be removed in from two to three months. In children from five to ten years of age, the time will vary from three to six, or eight months, according to the ligamentous rigidity which the feet may present." Even in adults "very few cases will . . . . be found requiring a longer period than a year, if the instrument . . . recommended be employed. This apparatus is calculated to shorten the duration of treatment in adult cases, but this will depend very much upon the amount of attention given to all the details of treatment by the surgeon himself."

Some cases of club-foot relapse, a longer or shorter time after their supposed cure, and this has naturally tended to throw great discredit upon the means employed in treatment. And hence it is very important to ascertain the causes of relapse, and upon this point great diversity of opinion has prevailed among writers on the subject.

> "The principal causes of relapse," says Mr. Adams, "which I recognize in the ordinary cases of varus, when submitted to treatment at a sufficiently early period, have reference to some defect either in the primary or in the after-treatment, and may be arranged under the following heads.
>
> "1st. Defects in the operative treatment, consisting of (*a*) omitting to divide one or more of the contracted tendons, or more correctly speaking, the tendons of contracted muscles; (*b*) incomplete division of tendons; (*c*) division of tendons in a wrong order; (*d*) inflammatory adhesions following clumsily performed operations, or some of the accidents, such as aneurism, etc., which may occasionally occur.
>
> "2d. Neglect or discontinuance of the after-treatment, either mechanical or physiological.
>
> "Other causes of relapse, however, undoubtedly exist, such as
>
> "3d. From the treatment not being commenced at a sufficiently early age.
>
> "4th. From congenital defects of muscular development, such as absence of the anterior and outer muscles of the leg."

In severe cases of relapse the treatment should be the same as if no previous operations had been performed.

If *congenital varus* is the most frequently met with of all forms of club-foot, the *non-congenital* variety is comparatively quite a rare affection. Mr. Tamplin's tables give but sixty out of 1780 cases (999 non-congenital) a proportion of but six *per cent.*, or three *per cent.* of the whole number. The deformity in cases of non-congenital varus can be easily remedied, but the prognosis, as regards the regaining of power, and general usefulness of the foot must be often very unfavourable. This is, of course, on account of the paralyzed condition of the muscles which usually exists in these cases, and the frequency of advanced fatty degeneration in the muscular structure. In some cases, especially where there is much ulceration of the foot from pressure, amputation, with the subsequent use of an artificial limb, may promise better than tenotomy and a long course of mechanical treatment. If, however, the latter be determined upon, the operation and subsequent treatment will not vary much from that adapted to cases of a congenital nature.

Chapters XVIII. and XIX. treat of talipes valgus, commonly known as splay-foot, or flat-foot. This deformity, like the others, may occur either as a congenital affection, or may be developed subsequently to birth. Splay-foot is perhaps the most painful and annoying of all the forms of club-foot;

for while patients are sometimes able to go through life, taking a considerable amount of active exercise even by walking, with a severe grade of talipes varus, a patient with valgus is generally incapacitated from walking more than short distances, and sometimes even from standing continuously for more than a very limited time.

The external characters, morbid anatomy, and pathology of talipes valgus are fully described by our author, and the remarks which we made concerning his chapters on varus, might be equally applied to this part of his volume. Congenital valgus is a very rare affection, Mr. Tamplin's tables giving but 42 cases of an uncomplicated form—a proportion of less than 2½ *per cent.* of the whole number. The non-congenital cases, on the other hand, were 181, being a proportion of over ten *per cent.* The *prognosis* in cases of congenital valgus may always be favourable, except in a few instances where the deformity is associated with malformation of the bones of the leg. Very slight cases may be cured in infancy by manipulation or mechanical treatment: in those which are more severe division of the peronei and extensor longus tendons may be practised, and in many cases the tendo-Achillis, and in some even the tibialis anticus and extensor pollicis tendons must be divided as well. Relapse is infrequent in cases of valgus, and can usually be effectually prevented by raising the heel on the inner side of the boot, and by introducing a stiff piece of leather to support the arch of the foot, and, if necessary, inserting a steel-plate in the corresponding part of the sole of the boot, so as to prevent it from giving way under the superincumbent weight of the body.

Cases of non-congenital valgus may be arranged in six classes, according to the causes which produce the deformity. These are (1st) Valgus depending upon ligamentous and muscular debility, (2d) Rachitic Valgus, (3d) Paralytic Valgus, (4th) Spasmodic Valgus, (5th) Traumatic Valgus, and (6th) Valgus consequent upon disease of the ankle-joint or surrounding tissues. In cases of the first class the prognosis will always be favourable: in the others the result must be very doubtful, though considerable comfort and ease to the patient can always be afforded. Most cases of valgus from debility can be cured without tenotomy: in severe cases, however, it will generally be found that the duration of the treatment may be considerably diminished by the operation, and it may therefore be resorted to where time is an object for consideration. In the adult, and in cases resulting from other causes than debility, tenotomy will usually be required: in one case where both feet and both knees were contracted, Mr. Adams divided no less than twenty-two tendons. A few remarks on talipes equino-valgus, and talipes calcaneo-valgus conclude the chapter.

The twentieth and last chapter of the volume treats of talipes calcaneus, with its compound varieties calcaneo-varus, and calcaneo-valgus respectively. Congenital calcaneus is a very rare affection, Mr. Tamplin's tables, before referred to, giving but nineteen cases. The non-congenital variety, together with cases of calcaneo-valgus, are represented by a much larger number, to wit, 110.

The prognosis of congenital calcaneus is exceedingly favourable; in fact the process of walking tends to bring about a spontaneous cure, which accounts for the disease never being met with in adults. Recovery may, however, be hastened by tenotomy in severe cases, and the tendons which then require division are the tibialis anticus, extensor proprius pollicis, extensor longus digitorum and peroneus tertius.

Non-congenital calcaneus generally is the sequel of infantile paralysis;

it may, however, be caused by non-union, or imperfect union of the tendo-Achillis after division, or by the contraction of a cicatrix upon the front of the leg. In the paralytic cases, the prognosis must of course be unfavourable, and a perfect cure must not be anticipated. In a case where imperfect union of the tendo-Achillis was the cause of the deformity, Dr. Little introduced a tenotomy knife, and incised the divided extremities of the tendon, lacerating the insufficient uniting medium. By then retaining the foot in an extended position, plastic material was abundantly formed, and considerable shortening of the tendon was obtained. As a rule, however, the treatment of non-congenital calcaneus is very unsatisfactory. This chapter contains an interesting section upon the resemblance of non-congenital talipes calcaneus to the distortion of the foot, artificially produced amongst the Chinese.

An appendix of sixty-two pages gives an account of three specimens illustrating the condition of the muscles, bones, etc., in different forms of non-congenital club-foot, and furnishes full details of seventeen cases in illustration of the principles laid down in the body of the work. This appendix, though not the most important, is perhaps the most interesting portion of the whole book. A tolerably complete index of eight pages terminates the volume.

We have thus endeavoured to give our readers a succinct view of the principal points brought out in Mr. Adams' work, and to induce them to refer to the book itself for the information which they will not fail to find there. We have no doubt but that Mr. Adams' treatise will be recognized as *the* treatise (*par excellence*) upon club-foot. It is because we think this that we deem it but right to call attention to a few minor errors and deficiencies.

In the first place the literary composition of the work is somewhat inelegant: this is, of course, a small matter, but scientific writings are not less useful for not being unattractive. Then we find some contradictory statements and manifest errors in the text, which are obviously the result of carelessness, and should be corrected in a second edition. Thus we are told on page 333, that "Talipes calcaneus is the rarest form of congenital club-foot;" while from pages 87 and 88, we find that Mr. Tamplin doubted if Pes Equinus were ever congenital, and that Mr. Adams himself has never seen but three such cases, and is not absolutely certain as to the congenital origin of these. Again, Mr. Tamplin's tables, which are continually referred to, give, we are told, 764 cases of congenital origin, and 999 of non-congenital; the total being stated at 1780, thus evidently leaving 17 cases unaccounted for in either category.

Proper names of the authors quoted are frequently misspelt: thus the well-known co-labourer of Barthez is sometimes called *Reilliet*, and sometimes *Rielliet*, but never by any chance by his correct name *Rilliet*.

Finally, the misprints in the volume are numerous, and occasionally tend to obscure the meaning. As examples we may instance *asphixiated* for *asphyxiated*, *fascial* for *facial*, *tibialus* for *tibialis*, and "*the mare*" for "*them are*."

The *matter* of Mr. Adams' book is excellent, and the illustrations are accurate and beautifully executed. By sparing time from his daily avocations to look after the particulars we have referred to, by smoothing off the asperities of his style, and by devoting more time and attention to proof-reading, our author will render his work as unexceptionable in all points as it even now is admirable in those which are most important.

J. A., Jr.